

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
24 June 2004 (24.06.2004)

PCT

(10) International Publication Number  
WO 2004/054105 A3

(51) International Patent Classification<sup>7</sup>: G01D 5/24, 1/18

(74) Agent: MIDGLEY, Jonathan, Lee; Marks & Clerk,  
57-60 Lincolns Inn Fields, London WC2A 3LS (GB).

(21) International Application Number:

PCT/GB2003/005350

(22) International Filing Date: 8 December 2003 (08.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0228562.5 6 December 2002 (06.12.2002) GB

(71) Applicant (for all designated States except US): AB AUTOMOTIVE ELECTRONICS LTD. [GB/GB]; Forest Farm Industrial Estate, Whitchurch, Cardiff CF14 7YS (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): MOON, Anthony [GB/GB]; 1 Radyr Court Rise, Llandaff, Cardiff CF5 2QH (GB). CLATWORTHY, Ceri [GB/GB]; 5 Cadle Crescent, Port Mead, Swansea SA5 5HP (GB). TSHIBANGU, Karim [—/GB]; 6 St. Anges Place, Kennington, London SE11 4BE (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

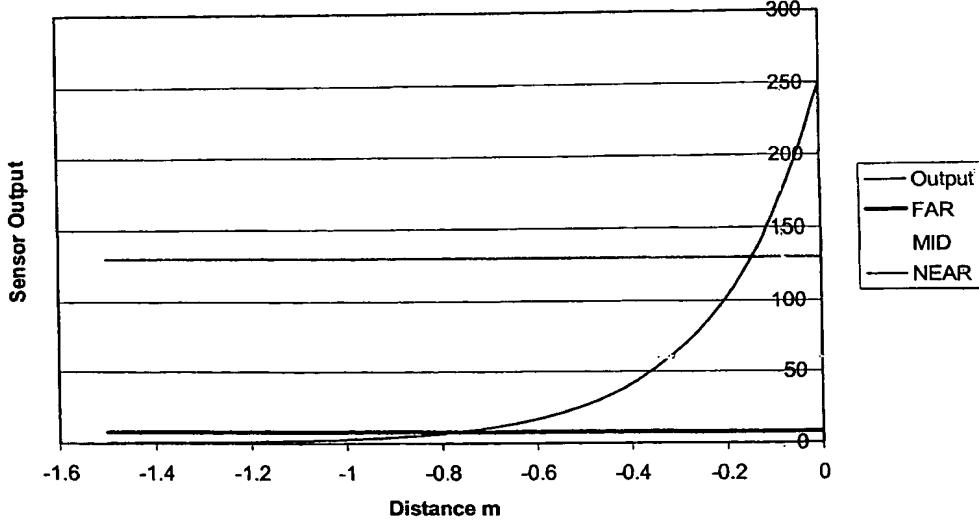
(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: CAPACITIVE PROXIMITY SENSOR



WO 2004/054105 A3

(57) Abstract: A method of detecting a proximate object using a capacitive sensor system, being measuring output signal data from the sensor over predetermined distance intervals and comparing the output signal data with predetermined comparison data indicative of an ideal sensor output signal sequence. Based on the comparison moderated data is output, such that, where an obtained output signal data value is lower value than a corresponding comparison data value, the moderated output data is given the value of the comparison data value, and otherwise the moderated output signal data is given the value of the obtained output signal data. Therefore the detection of low objects is improved through a comparison with data indicative of an ideal response signal.



(88) Date of publication of the international search report:  
19 August 2004

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/05350

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01D5/24 G01D1/18

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01D H03K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category <sup>a</sup>	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 521 515 A (CAMPBELL CHARLES E) 28 May 1996 (1996-05-28) the whole document	1,3,6,9
A	-----	2,4, 13-15,17
P,Y	FR 2 837 568 A (LI SHIH HSIUNG) 26 September 2003 (2003-09-26) the whole document	1,2,6,9, 12-15, 17,34
P,A	-----	3
Y	GB 2 366 385 A (AB AUTOMOTIVE ELECTRONICS LTD ; SENSATECH LTD (GB)) 6 March 2002 (2002-03-06) the whole document	1,2,6,9, 12-15, 17,34
A	-----	32

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the International filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the International filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the International search

13 April 2004

Date of mailing of the International search report

25.06.04

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Chapple, I

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB 03/05350

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-17, 32-35

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17,32-35

A capacitive proximity sensor

---

2. claims: 18-26

Method and apparatus for regulating a capacitive sensor

---

3. claims: 27-31

Producing a moderated value in a capacitive sensor system

---

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 03/05350

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 5521515	A 28-05-1996	NONE		
FR 2837568	A 26-09-2003	FR 2837568 A1		26-09-2003
GB 2366385	A 06-03-2002	AU 8423001 A EP 1316148 A1 WO 0219524 A1		13-03-2002 04-06-2003 07-03-2002